DC12: Sustainable Real-time Anomaly Detection for Practical Applications

Jia-Chun Lin (Kelly)

TUAI kick-off meeting

17.10.2024, SUT, Gliwice

- Jia-Chun Lin (Kelly) 林佳純
- Taiwan
- Associate Professor
- Department of Information Security and Communication Technology
- Norwegian University of Science and Technology (NTNU), Gjøvik campus
- Research groups/centre
  - Critical Infrastructure Security and Resilience Group (CISaR)
  - eHealth and Welfare Security (eHWS)
  - NORCICS (Norwegian Centre for Cybersecurity in Critical Sectors)- WP3 leader
- Research Areas
  - Time series analysis (prediction, representation, classification, clustering, anomaly detection)
  - Internet of Things
  - Security and privacy
  - Machine learning and deep learning
  - Parallel and distributed computing

PhD project details

- DC12: Sustainable Real-time Anomaly Detection for Practical Applications
- Work Package: 5
- Host Institution: NTNU
- PhD Supervisor: Assoc. Prof. Jia-Chun Lin (ER12/NTNU)
- Co-supervisor: Sandeep Pirbhulal (ER15/NRS)
  - Norsk Regnesentral: Norwegian Computing Center
- Auxiliary supervisors:
  - Victor Rodriguez-Fernandez (ER2/UPM)
  - Volker Stolz (ER13/HVL)
  - Dariusz Mrozek (ER6/SUT)
- R&D cooperation: Marek Drewniak (AIUT)
- Start date: Month 9
- Duration: 36 months
- Planned secondments:
  - UPM (4 months)
  - HVL (4 months)
  - SUT (4 months)

Objectives

- Real-time anomaly detection has gained substantial attention in various fields due to its ability to provide immediate insights into data streams, enabling timely responses to emerging threats.
- It is invaluable in sectors such as cybersecurity, industrial monitoring, healthcare, finance, and smart infrastructure, where rapid anomaly identification can enhance security, efficiency, and decision-making processes.
- The challenge is how to make real-time anomaly detection sustainable, i.e., how to achieve the desired goals of real-time anomaly detection while assuring resource efficiency, scalability, data privacy, resilience, transparency, interpretability, and applicability across different safety-critical domains.
- The objective of this PhD project is to address the above-mentioned challenges.

Expected Results

By the end of this PhD project, the following results are anticipated:

1. Comprehensive analysis of state-of-the-art solutions in real-time anomaly detection, with a focus on their sustainability aspects.
2. Successful development and implementation of a sustainable real-time anomaly detection solution tailored to effectively address the challenges identified earlier.
3. Demonstration of the solution's applicability to safety-critical cyber-physical systems, showcasing its robustness in critical operational environments.
4. Extensive evaluation of the implemented solution using a set of sustainability metrics.
5. Dissemination of project outcomes through research papers and conference presentations.

Applied research

- The research result of this PhD project will be applied to
  - the cyber-physical electricity systems of NRS
  - the National Smart Grid Laboratory at NTNU, Trondheim.

- DC12 will also participate in AIUT's applied projects on smart manufacturing.